PATENT SPECIFICATION

DRAWINGS ATTACHED

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1,175,505

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COMPLETE SPECIFICATION

Improvements in or relating to Chain Drive Systems

We, SEMPERIT OSTERREICHISCH-AMERIKANISCHE GUMMIWERKE AKTIENGESELLSCHAFT, an Austrian Company of Wiedner Haupstrasse 63, 1041 Vienna IV, Austria, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In automatic production and control systems, transport devices are often required which are moved intermittently at regular intervals and which stop at certain predetermined positions. In systems using conveyor belts, the necessary accuracy of stopping time or distance is low and therefore relatively easy to attain and a motor with a built-in brake is usually used for the drive.

If, however, lifts, packing and filling machines with individual stations, rotating table automats, conveyor belts or the like need to be brought to a stop at individual stations with an accuracy of a few millimetres or even fractions of a millimetre, a motor braking system is generally not sufficiently accurate. Due to the run-on of the drive motor and its own kinetic energy, or the inertia of the mass being transported, the transport device travels on a certain distance after braking has been initiated, for example by means of a limit-switch. This distance can seldom be predetermined, since it can be dependent amongst other things on the loading of the transport device, on the changes in friction produced by temperature variations, and so on.

The invention therefore consists in a stepping chain drive arrangement wherein a chain passes over at least two sprockets each having fewer than six teeth and wherein one of said sprockets is spring-mounted in such a way as to provide tension in the chain.

It is well-known that a smooth rotation of sprocket wheels is only achieved by using a minimum of six or seven teeth thereon. Uneven running is intentionally introduced in accordance with the invention by the use of a tooth-number below this so that it periodically changes between a so-called stable or favoured state and a so-called unstable state. This change from an unstable to a stable state is now utilised for selecting the stable state for an exact stop position. In this way it is possible to fix exactly the stop position of the chain drive.

A chain drive using four-toothed sprockets has been described in Austrian Patent Specification No. 240,273 but a chain having very short links is used and the diameter of the sprockets is accordingly kept small so that the running remains relatively smooth. In this Specification moreover there is no possibility of compensating for the various chain tensions. The selection of the low tooth number has been made only for the purpose of providing a 90°-spacing of the engagement points of the drive devices relative to one another.

An exemplary embodiment of the invention will now be described in detail with reference to the accompanying drawing in which:—

Figure 1 shows schematically a partial section of a four-toothed sprocket in a favoured position, and

Figure 2 shows the same in an unstable position.

This drive control includes a chain 5, which is guided over sprockets, one of which is preferably driven. One sprocket 1 is fixed to a shaft 2 running in a bearing 3 which can move in the longitudinal direction along a radius link 4. The tension of the chain 5 is provided by means of a compression spring

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6, which is mounted on a conveyor belt frame 7. The chain is guided by iron guides.

Figure 1 shows the step conveyor device in that position in which the spring 6 is least loaded and it follows that the conveyor belt endeavours to occupy this position.

Figure 2 shows the conveyor device in that position in which the chain tensioning spring 6 is loaded to the highest degree. The conveyor belt cannot remain in this position, since the spring 6 endeavours to pass from a more tensioned position into a less tensioned position with the smallest rotation of the sprocket This movement can occur in both rotation directions.

The determining factor for the auxiliary stopping effect is not the distance which the compression spring travels between the stable and unstable position of the sprocket 1, since this distance could be increased when using a larger number of teeth by selecting a larger sprocket diameter. The determining factor is the ratio of the two torques, which in the two positions shown in Figures 1 and 2 act about the centre point of the shaft 2. It is clear that this ratio is dependent only upon the number of teeth of the sprocket.

The mode of operation of these rotating arrangements is as follows:

1. The belt is put into motion and runs until a limit-switch is operated, which initiates braking at the motor.
2. The belt runs on further for some distance due to the run-on of the motor and its own kinetic energy.
3. The sprocket gets closer and closer to its favoured position during which the spring force and the chain tension become increasingly smaller.
4. The conveyor belt stops in a favoured position; the friction resistances are exactly the same as in the setting of the belt.
5. If different load or friction conditions occur, the belt will tend to come to a halt sooner or later than in the first example. The spring of the chain tensioning device however prevents, this, since the spring of the tensioning device would be loaded above its minimum should this occur, which has the result that the conveyor belt is finally brought into a favoured position by means of the spring.

If the diameter of the sprocket and the length t of the individual chain links remain the same, the progress of the transport device using a sprocket with only three teeth is particularly uneven. The auxiliary stopping effect would in fact in this case be even greater but for most uses an uneven running of this is unacceptable. With the use of four teeth, the optimum relationship between running unevenness and auxiliary stopping effect is achieved in accordance with the invention. The auxiliary stopping effect decreases very rapidly with an increasing number of sprocket teeth. Using five teeth it is already lower and with six teeth or more it is practically negligible.

WHAT WE CLAIM IS:—

1. A stepping chain drive arrangement wherein a chain passes over at least two sprockets each having fewer than six teeth and wherein one of said sprockets is spring-mounted in such a way as to provide tension in the chain.
2. A drive arrangement as claimed in Claim 1 wherein the bearings of said one sprocket are urged by a spring in a radial direction.
3. A drive arrangement as claimed in Claim 1 or Claim 2 wherein said sprockets have four teeth.
4. A drive arrangement as claimed in any one of Claims 1 to 3 wherein said one sprocket comprises a disc having peripheral slots to accommodate the transverse members of said chain.
5. A stepping chain drive arrangement substantially as herein described with reference to and as illustrated in Figures 1 and 2 of the accompanying drawings.

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1 SHEET. This drawing is a reproduction of the Original on a reduced scale

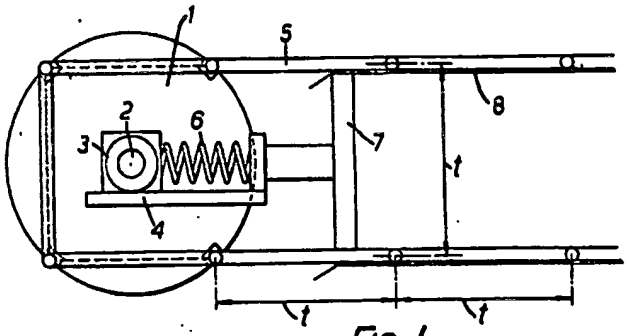

FIG. 1.

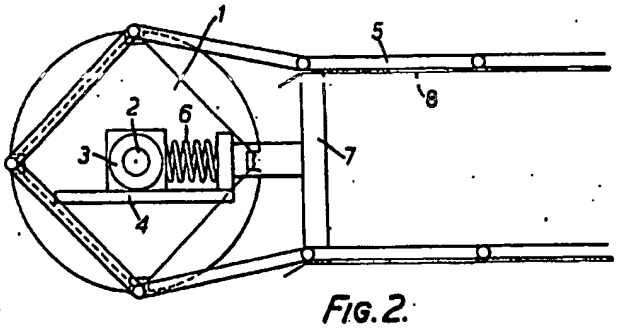

FIG. 2.